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EXAMINER

AFTERGUT, JEFF H

ART UNIT

PAPER NUMBER

1733

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/889,862

Applicant(s)

GUIRMAN ET AL.

Examiner

Jeff H. Aftergut

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) 30-40, 46, 47, 53 and 54 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-29, 41-45 and 48-52 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> . | 6) <input type="checkbox"/> Other: . |

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-29, 41,-45, and 48-52, drawn to a method of manufacturing a bowl.

Group II, claim(s) 30-40, 46, 47, 53, and 54, drawn to a bowl.

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: U.S. Patent 5,226,217 anticipates claim 1 and clearly suggested that there is a lack of a special technical feature associated with the claims of Group I.

3. During a telephone conversation with Charles Gagnebin on 11-20-02 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-29, 41-45, and 48-52. Affirmation of this election must be made by applicant in replying to this Office action. Claims 30-40, 46, 47, 53, and 54 have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

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Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 9, 11, 12, 19, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Olry et al '217.

Olry et al '217 suggested that one skilled in the art at the time the invention was made to lay a plurality of fabric plies upon a form in order to provide a desired shape followed by needling the assembled plies together in order to form a composite perform. The fiber of the fabrics employed in the operation included carbon fiber plies. The reference suggested that those skilled in the art would have densified the assembly to form a composite article which was capable of tolerating high temperature exposure. The reference suggested that the processing was useful for forming thermostructural composite performs of shapes which were otherwise difficult to achieve (see column 1, lines 12-22, and column 1, lines 25-52. the reference additionally suggested that the finished assembly would have been used as a parabolic dish or the nose for a space aircraft, column 3, lines 57-62. the reference additionally suggested that perform was formed by superposing a plurality of fabric performs 13 and needling the same together with the specified needling device. The reference suggested that those skilled in the art would have additionally densified the performs with either a pitch impregnation and carbonization operation or with chemical vapor deposition, see column 4, lines 63-68.

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It should be noted regarding claim 9 that the reference suggested the use of carbon fibers and did not suggested that there was any specific surface treatment provided for the same. one therefore would have to assume that no surface pretreatment was provided for the carbon fibers. Regarding claims 11 and 12, the reference suggested the needling of the layers together in the same manner as was performed by applicant. Regarding claim 19, the reference suggested that those skilled in the art at the time the invention was made would have utilized chemical vapor deposition as a means for densifying the finished assembly. Regarding claim 20, the reference disclosed a single piece nose cone for an aircraft and there were no slots or holes cut out of the same.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 9-13, 16-20, 25, 26, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh in view of Olry et al '217.

Walsh suggested that it was known to utilize the three dimensional weaving and joining techniques of the prior art utilized in the manufacture of aerospace components to form a crucible wherein the same would have been formed by manufacture of the perform followed by densification and graphitization of the same. more specifically, applicant is referred to column 2, lines 15-32 and column 4, lines 34-58 for the various techniques used to manufacture the 3-D structure used for making the crucible (which included various stitching operation and operations

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similar to those employed in manufacturing aerospace components). The reference taught that subsequent to the formation of the desired shaped perform (in the shape of a bowl for manufacturing a crucible, column 5, lines 16-21), the perform was subjected to various techniques useful for forming a carbon matrix including repeated steps of infiltration with a carbonizable material, carbonization, and then graphitization or chemical vapor deposition of carbon impregnation into the perform (column 5, lines 22-28). The reference taught that the temperatures employed in the graphitization and/or carbonization would have included temperature up to 4500 degrees C (see column 6, lines 1-31). The reference additionally suggested that any combination of the two impregnation techniques would have been suitable and additionally that the techniques would have been repeatedly performed to attain the desired amount of matrix density in the finished assembly, see column 6, lines 53-60, for example. The fabrics produced in Walsh were manufactured from carbon fibers or precursors of the same to form the carbon-carbon composite article. The reference did not expressly state that one skilled in the art would have shaped the plies upon a form and needled the same together to form the composite perform article prior to infiltration with the carbon matrix.

Olry et al '217 is discussed above in paragraph 6 and applicant is referred to the same for a complete discussion of the reference. The reference suggested that the lay up and needling operation would have facilitated the formation of composite performs of complex shape (such as nose cones for aerospace vehicles) which were difficult to achieve with typical stitching and/or weaving operation for such manufacture (see the portions referred to above). Olry et al '217 additionally suggested that the needled assembly would have been densified after manufacture. It would have been obvious to one of ordinary skill in the art at the time the invention was made to

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employ the perform forming techniques of Olry et al '217 in the process of manufacturing a crucible as taught by Walsh as such perform manufacturing techniques allowed one to manufacture a bowl shaped perform easily.

With regard to the use of carbon fiber having an interphase coating of pyrolytic carbon thereon, one skilled in the art would have recognized such fibrous material as known in the art of manufacturing carbon carbon composites (such is taken as conventional in the art) and the use of the same in the operation identified above would have been within the purview of the ordinary artisan. With regard to the controlling of the fiber density of the perform as a function of the needling operation, one skilled in the art would have readily appreciated that the needling operation of Olry et al '217 would have been controlled to attain the desired features with none but the expected results and that the device described therein was fully capable of operating in the manner necessary to achieve the specified control. Regarding the carbonization and graphitization operation, the reference to Walsh taught the specific operations as claimed.

9. Claims 2, 3, 5-7, 14, 15, 42, 43, and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 8 further taken with Monget et al and Cahuzac.

While the reference to Olry et al '217 suggested the lay up of plural fabric layers upon the form prior to the needling operation, there was no suggestion in the processing of the use of stitching as an alternative to needling nor was there any suggestion within the reference that the plies which were laid up on the form would have been laid such that the fibers from one layer to the next were offset from one another. The applicant is specifically advised, however, that the angle of the fibers in the various plies which would have been used dictated the strength of the

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final product (i.e. the ordinary artisan would have been expected to alter the angle of orientation of the plies in order to provide strength in various directions rather than providing all the strength in the same direction). To further support this contention as well as evidence that those skilled in the art would have found it obvious to stitch as well as needle the plies together, the references to Monget et al and Cahuzac are cited.

The applicant is advised that those skilled in the art at the time the invention was made would have understood that the plies would have been assembled with the fibers of the same running in various directions as evidenced by Monget et al, see column 4, lines 33-column 5, line 4. more specifically, the reference suggested that those skilled in the art would have known that the fibers would have been laid down at any angle including at 45 degrees to the direction of a previously laid ply, see column 5, lines 31-34. the reference suggested that after the laydown of the thread upon the form that one skilled in the art would have stitched through the same in order to retain the plies together. Like Monget et al, the reference to Cahuzac suggested the multiple plies would have been assembled together and laid up on a form wherein the layers were disposed at different angles relative to each other including at 45 degrees, see column 3, lines 57-60. the reference additionally suggested that those skilled in the art at the time the invention was made would have stitched thread through the layers so assembled in order to retain the same. Both references form performs which can later be subjected to resin impregnation. Because it would have been viewed as an alternative means for retaining the assembly of plies together, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the processing of Monget et al and Cahuzac to achieve assembly of the plies in the desired orientation in the formation of a composite crucible as set forth above in paragraph 8.

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10. Claims 4, 8, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 9 further taken with Olry et al '348.

The references as set forth above in paragraph 9 suggested that those skilled in the art at the time the invention was made would have applied a stitching and/or needling operation in order to join the plies together to make the perform of the process. The references failed to express that one skilled in the art at the time of invention would have recognized the knitting through the layers would have been an alternative means for providing thread to tie the layers of fabric together. However, the use of a knitting operation as an alternative to stitching and/or needling was known at the time the invention was made as evidenced by Olry et al '348. more specifically, applicant is referred to column 5, lines 44-65 for example. The reference to suggested that those skilled in the art of making a fiber preform would have known to knit the plies together as a alternative to stitching and/or needling the plies together. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the techniques of Olry '348 to assemble the fabric plies together in the process of making a composite perform from carbon fiber layers as set forth above in paragraph 9. Note that the use of knitting instead of needling or stitching would have been viewed as a functional equivalent alternate expedient in the art in light of the teachings of Olry et al '348.

11. Claims 21-24, 28, 29, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 8 further taken with E.P. 913,504 and Soviet Union Patent 1699755.

The references as set forth above in paragraph 8 suggested the overall operation, however there is no description of the formation of a hole in the crucible which was subsequently plugged

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with a thermostructural material. However, in the art of manufacturing crucibles from fiber reinforced composite material which was subjected to carbonization and/or graphitization, it was known at the time the invention was made to form the bowl with an opening in the bottom of the same followed by the application of a plug to the same as suggested by E.P. '504 and Soviet Union '755. More specifically, E.P. '504 suggested that those skilled in the art would have formed a graphite crucible with a hole at the bottom of the same which was plugged with suitable material as depicted in Figure 8. the reference was not specific as to the types of materials one would have employed for the plug, however those skilled in the art at the time the invention was made would have known to employ plugs made from graphite materials as suggested by Soviet Patent '755. more specifically, the abstract of Soviet Patent '755 made it clear that those skilled in the art at the time the invention was made would have employed a graphite material for the plug in the crucible. Additionally, the reference to Soviet Patent '755 made it clear that those skilled in the art would have understood that the crucible would have been provided with a hole therein by cutting out the hole (as an alternative to forming the sheet material such that a hole was formed without cutting). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a hole in the formed perform either in the manufacture of the perform during the lay up operation or as a result of cutting out the opening after manufacture wherein the opening would have been plugged with a suitable plug material which included a graphite material as suggested by E.P. 913,504 and Soviet Union Patent 1699755 in the process of making a composite crucible from graphite as set forth above in paragraph 8.

It should be noted that the inclusion of a coating upon the formed and graphitized body was suggested by E.P. '504 who suggested that one skilled in the art would have applied a pyrolytic carbon upon the body after formation of the same.

12. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 8 in view of E.P. 913,504 further taken with any one of Metter et al, Kondo et al, or Holcombe et al.

The references as set forth above in paragraph 8 failed to teach the application of an exterior coating about the finished assembly. However, such coatings were known when manufacturing a composite crucible as evidenced by E.P. '504 who suggested the application of a pyrolytic carbon coating about the exterior of the graphitized body. The references do not suggest that one skilled in the art at the time the invention was made would have incorporated a silicon carbide as the exterior coating. However, those familiar with the formation of crucibles for containing liquid metals would have found it obvious at the time the invention was made to employ a silicon carbide coating on the exterior of the crucible instead of a pyrolytic carbon coating as suggested by any one of Holcombe et al, Kondo et al, or Metter et al. each one of Holcombe et al (column 9, lines 16-45), Kondo et al (column 2, lines 5-12), or Metter et al (column 8, lines 40-56) all suggested that those skilled in the art at the time the invention was made would have incorporated a silicon carbide coating upon the crucible as an alternative material to pyrolytic carbon coatings. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a silicon carbide coating instead of a pyrolytic carbon coating upon the exterior of the carbon-carbon composite crucible as such was a well known alternative coating material as suggested by any one of Holcombe et al, Kondo et al, or

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Metter et al in the process of manufacturing a crucible where such pyrolytic carbon coatings would have been useful for crucibles as evidenced by E.P. 913,504 in the manufacture operation as set forth above in paragraph 8.

13. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 9 further taken with E.P. 913,504 and Soviet Union Patent 1699755.

The references as set forth above in paragraph 9 suggested the overall operation, however there is no description of the formation of a hole in the crucible which was subsequently plugged with a thermostructural material. However, in the art of manufacturing crucibles from fiber reinforced composite material which was subjected to carbonization and/or graphitization, it was known at the time the invention was made to form the bowl with an opening in the bottom of the same followed by the application of a plug to the same as suggested by E.P. '504 and Soviet Union '755. More specifically, E.P. '504 suggested that those skilled in the art would have formed a graphite crucible with a hole at the bottom of the same which was plugged with suitable material as depicted in Figure 8. the reference was not specific as to the types of materials one would have employed for the plug, however those skilled in the art at the time the invention was made would have known to employ plugs made from graphite materials as suggested by Soviet Patent '755. more specifically, the abstract of Soviet Patent '755 made it clear that those skilled in the art at the time the invention was made would have employed a graphite material for the plug in the crucible. Additionally, the reference to Soviet Patent '755 made it clear that those skilled in the art would have understood that the crucible would have been provided with a hole therein by cutting out the hole (as an alternative to forming the sheet

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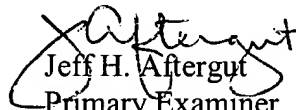
material such that a hole was formed without cutting). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a hole in the formed perform either in the manufacture of the perform during the lay up operation or as a result of cutting out the opening after manufacture wherein the opening would have been plugged with a suitable plug material which included a graphite material as suggested by E.P. 913,504 and Soviet Union Patent 1699755 in the process of making a composite crucible from graphite as set forth above in paragraph 9.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff H. Aftergut whose telephone number is 703-308-2069. The examiner can normally be reached on Monday-Friday 6:30-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on 703-308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Jeff H. Aftergut
Primary Examiner
Art Unit 1733

JHA
March 7, 2003